Exhibit 108

ON TALC TRANSLOCATION FROM THE VAGINA TO THE OVIDUCTS AND BEYOND*

A. P. Wehner and R. E. Weller

Biology and Chemistry Department

and

E. A. Lepel

Chemical Technology Department, Battelle, Pacific Northwest Laboratories, Richland, WA 99352, USA

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Abstract—The objective of this study was to investigate whether multiple vaginal depositions of neutron-activated talc in the cynomolgus monkey result in the translocation of this material to the uterus and beyond. Within a 45-day period, six monkeys received 30 applications of 125 mg neutron-activated talc, suspended in 0.3 ml physiological saline solution containing 1% carboxymethyl cellulose as a suspending agent. The suspension was deposited in the posterior vaginal fornix of the sedated monkeys. Two days after the final talc application, the animals were anaesthetized. Abdominal lavage was performed and the lavage fluid collected for γ-ray analysis. Also collected for γ-ray analysis were the following tissues/organs: ovaries, oviducts, uterus, and vagina with cervix. Six untreated control monkeys underwent the same procedures. The radioisotopes ^{46}Sc, ^{60}Co, ^{59}Fe and ^{51}Cr in the activated talc served as tracers. Only the samples containing vagina and cervix from the dosed monkeys contained varying quantities of talc. This demonstrates that no measurable quantities of talc, deposited by multiple applications in the vaginal fornix of the cynomolgus monkey, translocated to the uterus or beyond.

INTRODUCTION

Ever since Egli & Newton (1961) reported the apparent translocation of carbon black from the vagina to the oviducts in two of three female patients, increasing interest has focused on the question of whether particles can, indeed, migrate from the vagina to the oviducts and beyond. This question received additional attention following the observations of Henderson, Joslin, Turnbull & Griffiths (1971), who reported talc particles in 10 of 13 ovarian tumours in humans. These findings imply a translocation of talc from the vagina to the ovaries. Talc can be deposited in the vagina by dusting the perineum, or from sanitary napkins, diaphragms or condoms.

The results of several subsequent studies (DeBoer, 1971; Gardner, Fink & Hassler, 1980; Hassler, Gardner, Emmerling *et al.* 1974; Venter & Itteralde, 1979) were, in part, ambiguous (see under Discussion). Whether "insoluble", inanimate particles, deposited in the vagina, can penetrate the cervical barrier and migrate "upstream" against the ciliary beat of the oviductal epithelium without the aid of manipulative forces remained to be conclusively demonstrated.

In a pilot study (Wehner, Hall, Weller *et al.* 1985) prior to the more definitive study described in this paper, we first attempted to reproduce the results of Egli & Newton (1961) in the cynomolgus monkey (*Macaca fascicularis*), following their procedures as closely as practical. While our results suggested that no translocation of bone black particles took place, translocation could not be ruled out with certainty in the absence of quantitative analyses. Results of a quantitative experiment in the monkeys, for which we used neutron-activated talc to circumvent the problem of environmental contamination, indicated that no measurable quantities (> ~0.5 μg) of talc translocated from the deposition site in the vagina to the uterine cavity and beyond (Wehner *et al.* 1985). However, to be more conclusive, our results needed to be reproduced in a larger number of animals following multiple applications.

EXPERIMENTAL

A purified blend of cosmetic talc, supplied by the Cosmetic, Toiletry and Fragrance Association, Inc., and appropriate standards were exposed for 6.5 hr to an estimated neutron fluence of 1.2×10^{17} n/cm^2 in a 1 megawatt TRIGA reactor at Washington State University.

Using the detector efficiency curve generated when the neutron flux was determined, the talc was characterized in terms of disintegrations per minute (dpm) per μg talc (Table 1). Using a United States Geological Survey BHVO standard as a comparative standard, elemental concentrations in the talc sample were determined (Table 2). Counting time for the talc characterization was 20,000 seconds/sample (5.5 hr).

A quantity of neutron-activated talc was suspended in physiological saline solution containing 1% carboxymethyl cellulose (CMC; Sigma Chemical

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Table 1. Radionuclide concentrations in talc sample

Radionuclide	Concentration*
^{141}Ce	0.018 ± 3.2
^{58}Co	0.0839 ± 1.0
^{60}Co	0.297 ± 0.9
^{51}Cr	2.29 ± 0.9
^{59}Fe	0.617 ± 0.7
^{177}Lu	0.093 ± 9.3
^{54}Mn	0.026 ± 2.1
^{124}Sb	0.0039 ± 11.7
^{46}Sc	0.316 ± 0.7
^{169}Yb	0.010 ± 12
^{65}Zn	0.015 ± 6.9

*Given as dpm/µg talc ± 1σ counting error (error expressed as a percentage).

Table 2. Elemental concentration in the talc sample

Element	Concentration*	USGS BHVO	
		Counted*	Stated standard
Scandium	1.02 ± 0.4	30.0 ± 0.3	30
Chromium	117 ± 0.8	290 ± 1.0	290
Iron	9780 ± 0.6	85200 ± 0.6	85100
Cobalt	20.7 ± 0.8	45.0 ± 1.0	45
Nickel	394 ± 20	120 ± 28	120
Zinc	15 ± 10	102 ± 10	102
Antimony	0.015 ± 7.9	0.17 ± 7.2	0.17
Cerium	3.97 ± 3.3	40.0 ± 3.1	40
Europium	0.084 ± 4.9	2.1 ± 3.4	2.1
Terbium	0.087 ± 18	1.0 ± 16	1.0
Lutetium	0.037 ± 12	0.32 ± 12	0.32
Hafnium	0.19 ± 7.7	4.10 ± 4.4	4.1
Tantalum	0.071 ± 13	1.08 ± 12	1.08
Thorium	0.35 ± 13	1.0 ± 18	1.0
Ytterbium	0.28 ± 14	2.1 ± 16	2.1

USGS BHVO = United States Geological Survey
*Given as ppm ± 1σ counting error (error expressed as a percentage).

Co., St Louis, MO) as a suspending agent so that 0.3 ml of the suspension contained 125 mg talc.

From 12 female exbreeder cynomolgus monkeys, obtained from the Medical Lake Field Station of the Regional Primate Research Center at the University of Washington, six monkeys with the most regular menstrual cycle were selected for dosing with neutron-activated talc for 30 consecutive workdays. Menstrual cycles were determined by inspection of the catch pans under the cages for menstrual blood. The remaining six monkeys served as untreated controls. The monkeys were 4- to 12-yr-old exbreeders (multiparae), ranging in weight from 2.4 to 4.35 kg.

After sedation (25 mg ketamine hydrochloride, intramuscular) each of the six dosed monkeys was placed on her back and restrained by taping hands and tail to a plywood restraining cross. The pelvis was elevated at an angle of about 20 to 25°. The legs were held with the knees bent close to the chest, using a Velcro strap as a restraining mechanism. A nasal speculum was inserted into the vagina and opened to expose the cervix. Each of the six animals received approximately 125 mg neutron-activated talc, suspended in 0.3 ml physiological saline solution containing 1% CMC. The suspension was deposited in the posterior fornix of the vagina, using a 1.0-cm³ Tuberculin syringe with a stainless-steel animal feeding needle (CVD 18 ga. × 0.5 in; Popper & Sons, Inc.,

New Hyde Park, NY). Once a week, 10 units of oxytocin were injected intramuscularly at the same time as the talc deposition. Following dosing, the animals were maintained in the restrained position for approximately 20 min and then returned to their cages.

Two days after the thirtieth talc deposition, the six dosed animals were anaesthetized by intramuscular injection of 100 mg (1 ml) ketamine hydrochloride and weighed. The abdominal area was shaved. To recover talc particles that may have translocated to the peritoneal cavity, peritoneal lavage was performed by injecting approximately 135 ml physiological saline solution into the peritoneal cavity, followed by brief gentle massage to distribute the lavage fluid and wash off any talc particles which might have adhered to the serous membranes of the peritoneal cavity. The peritoneal cavity was then opened by incision and the lavage fluid collected by aspiration with a syringe for γ-ray analysis. The lavage was repeated once through the abdominal incision.

Precautions to avoid contamination and cross-contamination of samples included the use of clean instruments for each sample to be collected and starting with the collection of samples least likely to contain translocated talc, i.e. lavage fluid and ovaries. Both ovaries were collected in one polyethylene vial for γ-ray analysis. Both oviducts were similarly collected and sectioned into three parts of approximately equal length for γ-ray analysis, followed by collection of the body of the uterus. Because deposition of talc in the area of the vaginal fornix might also result in the direct mechanical deposition (rather than physiological translocation) of talc in the uterine cervix, the cervix of the uterus was dissected from the body and analysed together with the vagina. Thus, the following seven samples from each of the animals were analysed: peritoneal lavage fluid (Sample 1); right and left ovaries, combined (Sample 2); three sections of right and left oviducts (right and left corresponding sections combined in Samples 3a, 3b and 3c; Sample 3a contained the two oviduct sections adjacent to the ovaries, Sample 3c those adjacent to the uterus); body of the uterus (Sample 4); and vagina with cervix (Sample 5). Treated and control animals were then killed by iv injection of a barbiturate-based solution.

Tissue samples were collected for γ-ray analysis in labelled, acid-cleaned polyethylene vials, dried and heat-sealed before analysis, using an infra-red heat lamp. Peritoneal lavage samples were evaporated to approximately 2.5 ml of liquid. Bulk talc standards and liquid standards of iron, cobalt, chromium and scandium in geometrical arrangements similar to those of the samples were analysed on each detector system used for sample analysis. Counting times ranged from 1000 to 2000 min, depending on the activity in the samples.

The samples were counted on two different detector systems. The first was a unique high-resolution, low-background intrinsic germanium (IG), or a lithium-drifted germanium [Ge(Li)] detector with either a NaI(Tl) or plastic phosphor anti-coincidence shield. This system separates the γ-rays emitted into one of two spectral regions. Those γ-rays detected

simultaneously in both the IG [or Ge(Li)] detector and the NaI(Tl)—or plastic phosphor—anti-coincidence shield are stored in the second spectral region. The γ-rays detected only by the IG [or Ge(Li)] detector are stored in the first spectral region. The great advantage of this system is the reduction of the Compton background by one order of magnitude in the non-coincident portion of the spectrum, resulting in greater sensitivity. The second system was a low-level, ultra-low background NaI(Tl) γ-γ coincidence multi-parameter detector system. This combination provides unmatched sensitivities for the detection of very low-level radioisotope activities. The anti-coincidence system preferentially detects non-coincident γ-rays (^{59}Fe, ^{51}Cr) whereas the multi-parameter system is designed to preferentially detect coincident γ-rays (^{46}Sc, ^{60}Co). Because of the time elapsed from the irradiation of the talc and the decay of the relatively short-lived radioisotopes ^{51}Cr and ^{59}Fe ($t_{1/2} = 27.7$ and 44.5 days, respectively), two anti-coincidence detector systems were used to expedite γ-ray analysis. The signals were fed through the appropriate electronics to a 4096-channel analyser that was interfaced to a PDP 11/44 computer for data storage and subsequent data analysis. As mentioned, the second detector system was a NaI(Tl) γ-γ co-incidence multi-parameter system. Again, two nearly identical (multi-parameter) systems were used to expedite the counting. The detectors were interfaced via the appropriate electronics to a 4096-channel multi-parameter analyser and the data transferred to magnetic tape. This tape was read into the PDP 11/44 computer for subsequent data analysis. The counting systems were standardized using aliquots of known concentrations of NBS traceable standards obtained from Amersham Corporation (^{60}Co, ^{51}Cr, and ^{59}Fe) and New England Nuclear Corporation (^{46}Sc).

When the infrared heat lamp was turned off, two ovaries were found on the counter next to their sample vials. These ovaries apparently had "popped" out of their vials during the drying process. Without means to determine which ovary was from what animal, these two ovaries were labelled XI and X2 and treated as separate samples.

RESULTS

A γ-ray spectrum of the irradiated talc is shown in Fig. 1. Various isotopes are identified, but the most suitable isotopes for our purposes were ^{46}Sc, ^{51}Cr, ^{59}Fe and ^{60}Co. A typical spectrum from the anti-coincidence detector system for the sample from monkey No. 81-086-5, which had the most direct contact with the deposited talc, namely the vagina with cervix (Sample 5), is shown in Fig. 2. Measurable quantities of ^{46}Sc, ^{51}Cr, ^{59}Fe and ^{60}Co were found in this sample. The peaks of ^{59}Fe and ^{51}Cr are readily apparent in the non-coincidence portion of the spectrum. A typical spectrum from the body of the uterus (Sample 4) of monkey No. 81-081 is shown in Fig. 3. The γ-rays, associated with the previously mentioned radioisotopes characteristic of talc, are not present. Instead, its spectrum closely resembles the background spectrum shown in Fig. 4, which is from the vagina and cervix (Sample 5) of control

monkey no. 79-280 in which only background radio-isotopes were present.

Radioisotope data for ^{46}Sc and ^{60}Co from the multi-parameter system, and ^{59}Fe and ^{51}Cr data from the anti-coincident systems, are combined in Tables 3 and 4 for the experimental and control samples, respectively. Where applicable, a 'less-than' value is reported. This value is based on one standard deviation of the background observed in the collected spectrum.

Once the most representative values for the samples had been determined, the results were converted from dpm to μg of talc where applicable. This conversion was based on the radionuclide concentration in the talc, namely: $0.316 \pm 0.7\%$ for ^{46}Sc, $2.29 \pm 0.9\%$ for ^{51}Cr, $0.617 \pm 0.7\%$ for ^{59}Fe, and $0.297 \pm 0.9\%$ dpm per μg of talc for ^{60}Co. The conversion of the observed activity (dpm per sample) to μg of talc per sample was made as follows:

$$M_{talc} = (A_{net})_{element}/(A_{talc})_{element}$$

where M_{talc} = mass of talc in μg talc/sample, A_{net} = net decay-corrected activity in dpm/sample, and A_{talc} = decay-corrected activity of talc in dpm/μg of talc.

The quantities of talc per sample have been reported, where applicable, in Table 3. As expected, measurable quantities of talc were observed in the vagina + cervix sample (Sample 5) from each dosed monkey. Their quantity was estimated using the values for ^{46}Sc and ^{60}Co reported for each sample. The observed quantities of talc for these samples were 77,000, 117,000, 63,000, 470, 18 and 6 μg of talc. These wide variations were most likely due to different phases of the animals' menstrual cycles at the time of death, with menstrual flow cleansing the vagina of much of the deposited talc. No measurable levels of the activated talc were present in any of the other samples.

DISCUSSION

The oviducts provide a passage from the ovaries and the peritoneal cavity to the uterus and the vagina. This pathway can be travelled by cells in either direction as demonstrated by ova and spermatozoa. Gases and liquids such as radio-opaque contrast material and dyes can also be passed by appropriate manipulation through the cervix into the peritoneal cavity. It is less clear whether or not inanimate particles such as carbon black or talc can translocate of their own accord from the vagina to the oviducts and beyond.

As already mentioned, in two of three cases Egli & Newton (1961) found carbon particles in the liquid with which they flushed the oviducts of three patients half an hour after carbon black deposition in the vagina. Theirs was a non-quantitative study that did not include the examination of liquid or filter blanks as negative controls. In a similar experiment with cynomolgus monkeys, we observed approximately equal quantities of carbon black particles in the flushing liquid as well as in our liquid blanks. In light of our previous findings (Wehner et al. 1985), it is possible that Egli and Newton might have observed false positives due to sample contamination.

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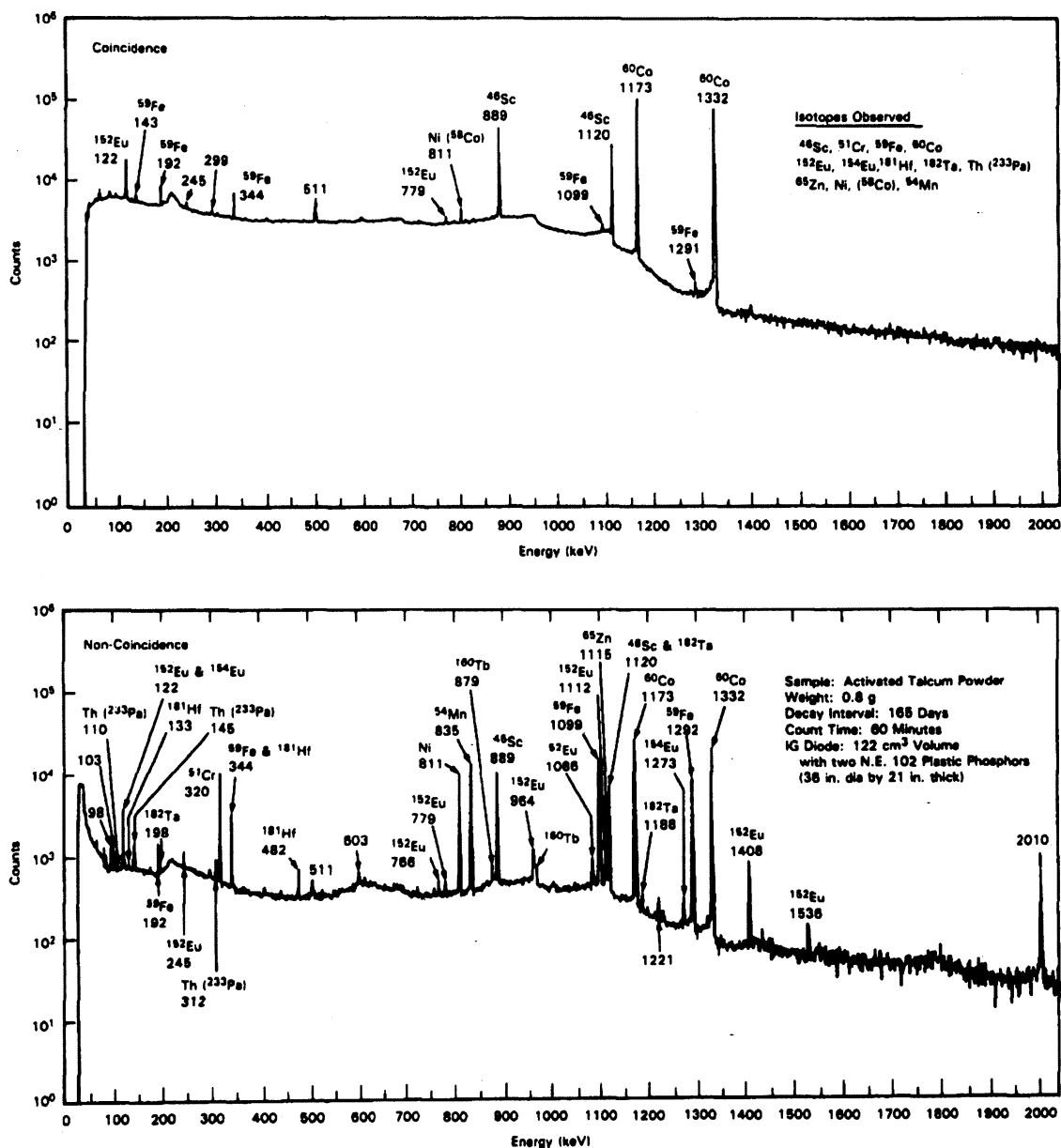

Fig. 1. Gamma-ray spectrum of neutron-activated talc.
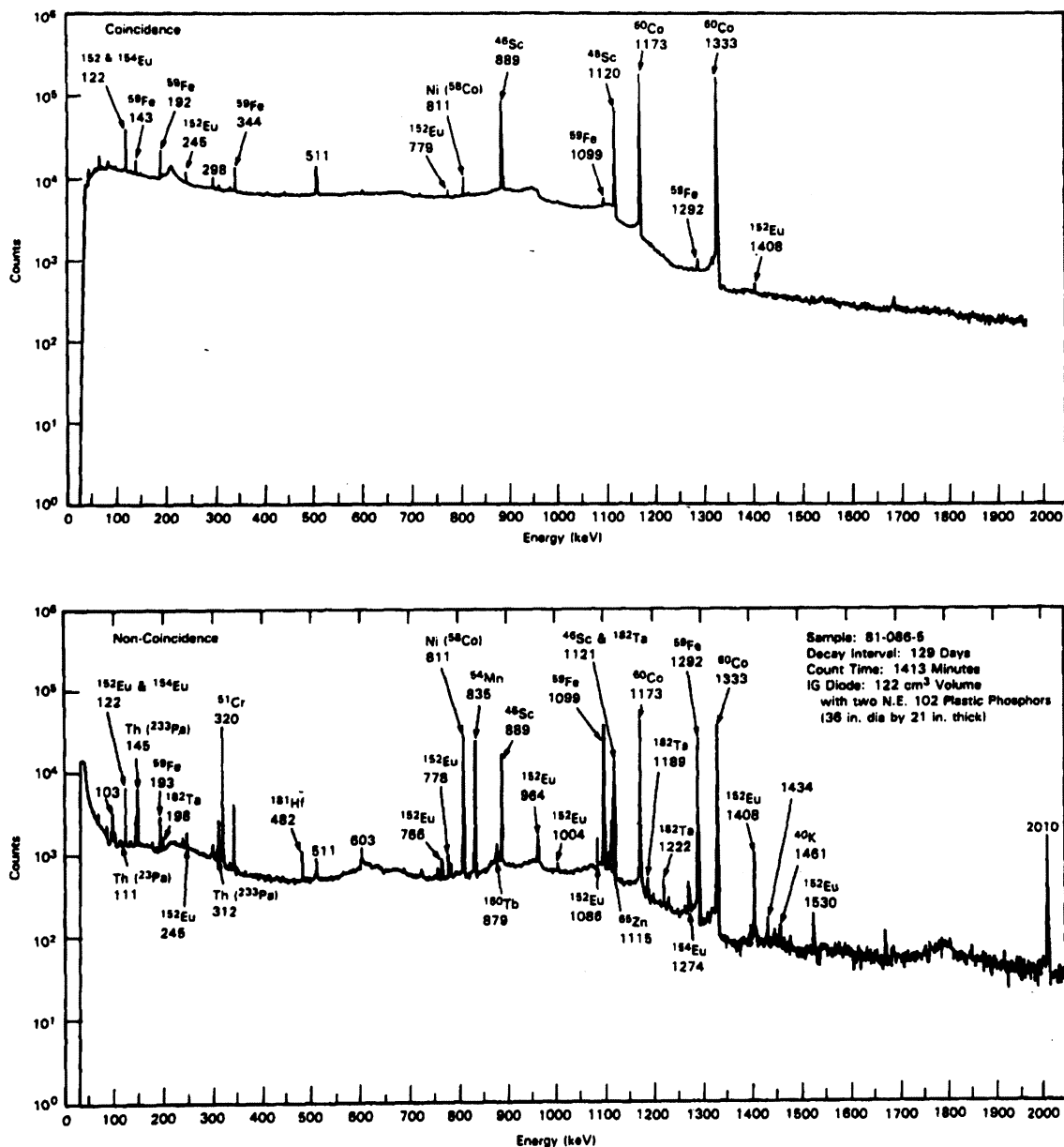
Fig. 2. Gamma-ray spectrum of Sample 5 (vagina + cervix) from monkey 81–086, which had received 30 applications of neutron-activated talc.

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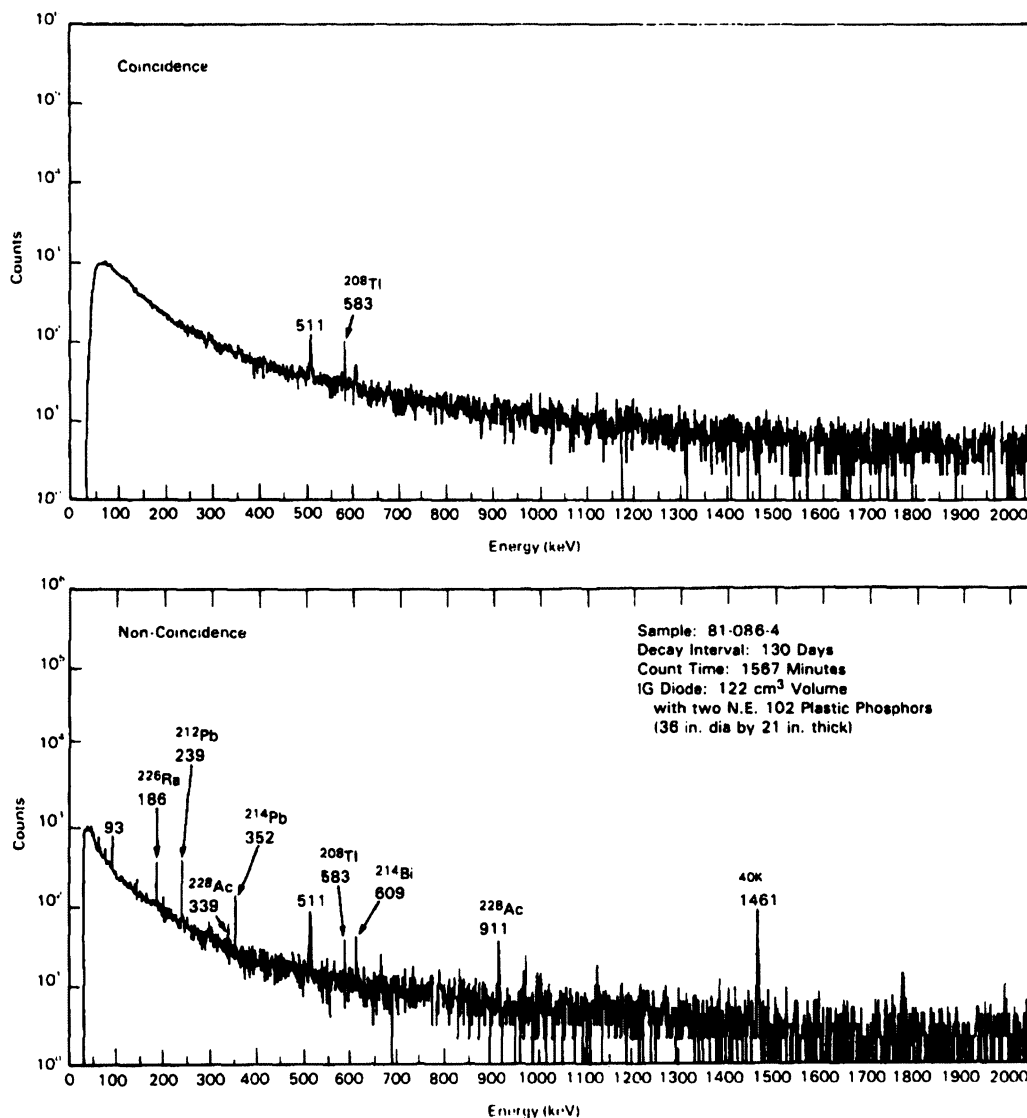

Fig. 3. Gamma-ray spectrum of Sample 4 (body of uterus) from monkey 81–081, which had received 30 applications of neutron-activated talc.
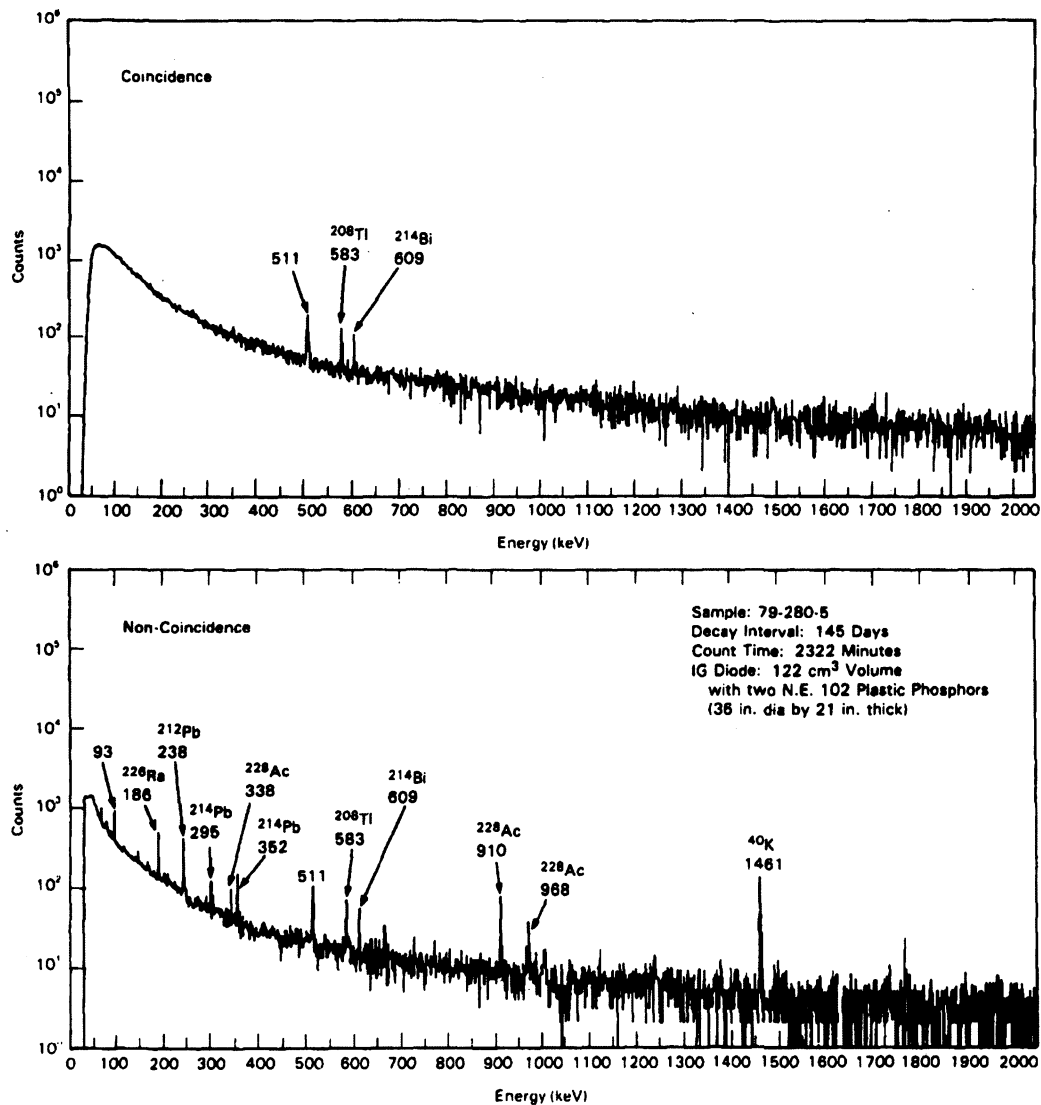
Fig. 4. Gamma-ray spectrum of Sample 5 (vagina + cervix) from control monkey 79–280.

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Table 3. Best activity values observed in tissue samples and peritoneal lavage fluid from monkeys
treated with neutron-activated talc by vaginal deposition

Monkey and sample numbers*	Activity (mean dpm/sample ± SD)				
	Scandium	Chromium	Iron	Cobalt	Average
79-252					
1	<0.26	<81	<4.5	0.40 ± 0.13	
2	1.1 ± 0.4	<41	<3.1	0.52 ± 0.15	
3a	<0.24	<60	<3.7	<0.11	
3b	<0.26	<41	<2.7	<0.11	
3c	<0.22	<44	<2.4	<0.11	
4	<0.20	<70	<4.8	<0.11	
5	22000 ± 200	342600 ± 500	66900 ± 1300	25010 ± 15	
μg of talc	69600 ± 600	124500 ± 500	128700 ± 800	84210 ± 50	77000 ± 10000
79-256					
1	1.0 ± 0.3	<68	<3.7	<0.13	
2	<0.30	<56	<3.9	<0.12	
3a	<0.28	<63	<3.7	<0.13	
3b	<0.23	<42	<2.9	<0.11	
3c	<0.27	<30	<2.2	<0.11	
4	0.61 ± 0.25	<60	<4.5	<0.11	
5	34370 ± 350	382700 ± 1800	104300 ± 2000	37330 ± 50	
μg of talc	108800 ± 1100	189100 ± 600	188000 ± 1300	125700 ± 200	120000 ± 12000
81-086					
1	<0.25	<101	<5.5	<0.11	
2†	<0.29	<68	<3.7	<0.11	
3a	<0.33	<85	<4.8	<0.13	
3b	<0.27	<45	<2.8	<0.13	
3c	<0.26	<37	<2.5	<0.12	
4	<0.18	<70	<3.7	<0.10	
5	18300 ± 200	241300 ± 500	47500 ± 1100	20500 ± 20	
μg of talc	57900 ± 600	101700 ± 400	99100 ± 400	69020 ± 70	63000 ± 8000
81-092					
1	<0.22	<85	<5.7	<0.11	
2	<0.29	<52	<3.2	<0.11	
3a	<0.31	<74	<3.9	<0.12	
3b	<0.29	<49	<3.3	<0.12	
3c	<0.25	<35	<2.6	<0.10	
4	<0.20	<60	<4.0	<0.11	
5	138 ± 2	1090 ± 200	342 ± 8	150 ± 1	
μg of talc	437 ± 6	560 ± 40	760 ± 30	505 ± 5	470 ± 50
81-102					
1	<0.26	<93	<6.0	<0.12	
2	<0.24	<57	<3.0	<0.09	
3a	<0.27	<85	<4.1	<0.10	
3b	<0.21	<47	<3.0	<0.11	
3c	<0.23	<35	<2.6	<0.11	
4	<0.19	<55	<4.4	<0.09	
5	8.6 ± 0.5	<60	13 ± 5	2.6 ± 0.2	
μg of talc	27 ± 2	<26	21 ± 8	8.7 ± 0.7	18 ± 13
81-166					
1	<0.22	<86	<5.5	<0.10	
2†	<0.33	<83	<4.5	<0.12	
3a	<0.32	<64	<3.5	<0.11	
3b	<0.22	<66	<3.8	<0.11	
3c	<0.23	<41	<3.0	<0.11	
4	<0.23	<70	<4.5	<0.11	
5	2.1 ± 0.3	<60	<4.7	1.4 ± 0.1	
μg of talc	6.6 ± 1.0	<26	<7.6	4.7 ± 0.3	5.7 ± 1.3
X1	<0.31	<45	<3.1	0.27 ± 0.12	
X2	<0.31	<46	<2.9	<0.10	

†Sample numbers: (1) peritoneal lavage fluid, (2) right and left ovaries combined, (3a, 3b and 3c) three sections of right and left oviducts, (4) body of the uterus, and (5) vagina with cervix.
†One of the two ovaries "popped" out of the vial during the drying process. The activities of the popped out ovaries are listed as X1 and X2.

DeBoer (1972) deposited 0.2 ml of a colloidal carbon black suspension in the uterine cavity, the cervical canal or the vagina of well over 100 patients prior to abdominal surgery. Subsequent macroscopic examination of the oviducts showed rapid translocation of the carbon black deposited in the uterus to the oviducts and beyond in the majority of the cases. Some of the carbon black deposited in the cervical canal also translocated, but to a lesser extent. However, "from the vagina to the uterus passage of the marker was observed only twice in thirty-seven investigations." DeBoer pointed out that his patients were placed in the Trendelenberg position after the abdomen had been opened and that "in this position, especially under anaesthesia, there is a negative intra-abdominal pressure which may be sufficient to draw

Table 4. Best activity values observed in tissue samples and peritoneal lavage fluid from control monkeys

Monkey and sample numbers[*]	Activity (dpm/sample)			
	Scandium	Chromium	Iron	Cobalt
77-403				
1	<0.34	<150	<6.1	<0.13
2	<0.35	<87	<4.3	<0.11
3a	3910 ± 20	<86	<4.4	<0.12
3b	<0.33	<64	<3.5	<0.10
3c	<0.27	<79	<3.8	<0.08
4	<0.25	<100	<5.2	<0.09
5	<0.25	<110	<5.6	<0.11
77-091				
1	<0.28	<140	<6.5	<0.10
2	<0.40	<160	<6.3	1.3 ± 0.2
3a	<0.35	<130	<5.6	<0.11
3b	<0.40	<97	<4.2	<0.13
3c	<0.54	<180	<7.4	<0.18
4	<0.27	<100	<5.7	<0.10
5	<0.30	<100	<5.1	<0.13
79-280				
1	<0.26	<140	<6.9	<0.09
2	<0.45	<150	<6.1	<0.14
3a	<0.35	<180	<7.2	<0.11
3b	<0.43	<130	<5.0	<0.14
3c	<0.34	<170	<6.0	<0.11
4	<0.28	<140	<9.1	<0.10
5	<0.22	<87	<4.9	<0.11
80-053				
1	<0.26	<160	<7.7	<0.09
2	<0.25	<180	<8.0	<0.07
3a	<0.30	<190	<8.2	<0.08
3b	<0.43	<180	<7.2	<0.12
3c	<0.43	<160	<7.2	<0.12
4	<0.25	<130	<6.0	<0.09
5	<0.22	<120	<6.7	<0.10
80-087				
1	<0.31	<140	<6.8	0.71 ± 0.13
2	<0.40	<110	<4.8	<0.22
3a	<0.36	<150	<6.1	<0.11
3b	<0.40	<160	<6.7	<0.11
3c	<0.40	<140	<6.6	<0.11
4	<0.21	<130	<6.1	<0.08
5	<0.19	<140	<6.3	<0.08
81-164				
1	<0.38	<160	<6.7	<0.13
2	<0.44	<150	<6.7	<0.11
3a	<0.40	<140	<7.1	<0.11
3b	<0.44	<120	<5.3	<0.12
3c	<0.45	<110	<4.6	<0.12
4	<0.29	<130	<7.9	<0.12
5	<0.29	<110	<5.2	<0.11

[*]Sample numbers: see Table 3 footnote.

up material from the vagina into the uterus, particularly through a relaxed cervix." He further pointed out that one of these two positive patients was a multipara (six children) with a lacerated cervix. De-Boer's results tend to support our findings by indicating that the cervical canal represents a formidable barrier to the translocation of insoluble inanimate particles from the vagina to the uterus.

Hassler *et al.* (1974) observed transcervical migration of [125]I- or [55]Sr-labelled microcapsules in rabbits and in some but not all stumptail monkeys and baboons when the sedated primates were maintained in their supine positions for 1 or 6 hr following dose administration (Gardner *et al.* 1980). When migration did occur, it varied greatly from animal to animal and was on the order of 1% or less during the first 24-hr period following dosing. The difference

between our results and those reported by Gardner *et al.* (1980) may be due to differences in experimental procedures; Gardner *et al.* administered considerably higher doses per application (~1 g), used markedly different materials and a longer sedation time, and maintained the primates much longer in a supine position after dosing.

Venter & Iterralde (1979) placed ^{99m}Tc-labelled human albumin microspheres (HAM) in the vaginas of patients, followed by surgical removal of uterus, oviducts and ovaries. These tissues/organs were then analysed for ^{99m}Tc, using a scintillation detector. In 9 of 14 cases, radioactivity levels were detected in the oviducts and ovaries; the remaining five cases were negative. All negative cases occurred in patients with proven oviduct changes due to previous infection. While Venter & Iterralde (1979) provide strong suggestive evidence for the translocation of microspheres from the vagina to the oviducts and ovaries, their case is not necessarily conclusive. This statement is based on the observation that the activity from a single radionuclide label measured in organs/tissues does not necessarily prove the presence of particles because radionuclides can leach from the particles (Subramanian, Rhodes, Cooper & Sodd, 1975; Wehner & Wilkerson, 1981; Wehner, Wilkerson, Cannon *et al.* 1977; Wehner, Wilkerson, Mahaffey & Milliman, 1980; Wehner, Wilkerson & Stevens, 1984) as specifically demonstrated for ^{99m}Tc-labelled HAM (Bolles, Kubiatowicz, Evans *et al.* 1971). Misleading conclusions due to the dissociation of radionuclide labels from test materials can be avoided by monitoring for more than one radionuclide. Comparing the ratios of several radionuclides-to-test-material in the bulk material to these ratios in the material deposited in any given tissue will reveal leaching because each radionuclide dissociates at a different rate from a given material (Wehner & Wilkerson, 1981; Wehner *et al.* 1977, 1980 & 1984).

Henderson *et al.* (1971) found talc particles in 10 of 13 ovarian tumours in humans, using an extraction-replication technique (Henderson, 1969). Cramer, Welsh, Scully & Wojciechowski (1982) observed a statistically significant ($P < 0.003$) relationship between epithelial ovarian cancer and talc used for dusting the perineum or sanitary napkins in 215 women. Both of these two clinical studies imply translocation of talc to the ovaries. However, Cramer *et al.* (1982) found no relationship between ovarian cancer and talc exposure from dusting condoms or diaphragms, even though talc, in the latter applications, is deposited close to the cervical os. Hartge, Hoover, Lesher & McGowan (1983) made a similar observation from their epidemiological study. Their data indicated that the use of talc on a diaphragm did not appear to elevate risk and that there was no overall association between talc use and risk of ovarian cancer. Phillips, Young, Hardy & Gangolli (1978) found no translocation of ^{3}H-labelled talc from the vagina to ovaries in the rabbit.

None of these studies conclusively answers the question of whether or not talc, deposited in the vagina of the human female, translocates to the oviducts and beyond without purposeful manipulation. Our study, using state-of-the-art techniques in the most suitable animal model available, failed to

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provide any evidence for such translocation of measurable quantities (> ~0.5 μg, depending on the radionuclide, detector system and counting time) of talc.

It would, indeed, be difficult to explain such a translocation of "insoluble" inanimate particles. They lack the locomotion of spermatozoa and are unable to respond to chemotactic or physiological stimuli. It is, therefore, reasonable to assume that the behaviour of such particles is largely governed by the laws of physics. These laws would not permit particles to migrate "upstream" against the direction of the beat of the oviduct's ciliary epithelium, even if the particles had managed to somehow breach the cervical barrier and diffuse across the uterine cavity.

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